

THE METALLIFEROUS FORMATION OF THE PENINSULA.

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The principal object of this paper is to direct attention to and invite information about the primary mineral deposits in this Peninsula, and from personal observation, I have formed a theory regarding its origin, which I would humbly advance.

We are aware that gold, tin, and galena have been a source of export from the peninsula for some centuries, and that the early Portuguese and Dutch settlers used to return to their contries with rich cargoes of those precious metals. Some of the workings that were active in the last century are still yielding valuable results; others were abandoned on account of the extortion and oppression of native princes, others from the alluvial washings and shallow leaders having "run out."

A different order of things exists at the present day; chemistry, geology, and steam have as in other countries converted obsolete mines into valuable properties, and if the same services are applied to the Malay Peninsula the country might become rich and prosperous.

It would appear that the Malay Peninsula would be a vast uninhabitable jungle, were it not that the interior yields rich gold and tin alluvial deposits on either side of the range of hills that form the back-bone of the country. These deposits, crushed and washed down by nature from their original rocky bed, have attracted large numbers of Chinese miners for many years, and on their industry (for the Malay miners are in a very inferior minority) the Revenue and prosperity of the Peninsula in a great measure depend. A part from political and protective purposes. It would appear to be a question whether the Native States were worth interfering about the tin not exist.

The soil is generally of a very poor description. With the exception of a few patches of good limestone country, it is a granite formation of recent date, slowly undergoing decomposition, and as yet quite unable to cope with the rich loams of such countries as Cuba or Java. Malays do not grow sufficient rice for their own consumption and with the exception of consumption tin, nearly all that comes under the title of "Straits produce," comes from other countries, and merely rests at Singapore and other ports for transshipment. The tin produce, and the consequent importation of Chinese miners, being so essential to the prosperity of the country, I have gathered together a few notes, made during exploring expeditions, with a view to ascertain the root, direction, and source from whence these alluvial deposits are shed.

Starting from Tanjong Tohor, a few miles S. E. of the Moar River, a line in a northerly direction would pass at first through the old gold workings of Tanjong Tohor and the neighbouring hills of Bukit Formosa, thence to the gold leaders of Chindras, Mount Ophir and the River Kēsang and to the extensive tin deposits of the Kēsang and the eastern boundary of the Malacca Territory. There is no doubt in my mind that Chindras is on a spur or leader from the main reef, the gold being found in pockets or nests; but gold leaders are often richer than the main reef, and if the enterprising Directors of the defunct Chindras Company had sunk deeper than they did (their deepest shaft being only about 100 feet they might have reached a more compact body of stone.

I would shew a piece of tin ore that was got at Chin-Chin, on a tributary of the river Kēsang here the tin is firmly imbedded in a piece of rock that was formerly granite and has been subject to volcanic influences. The leader from which this was picked up cannot be far from the line of the lode which I believe to exist in a direction show by the red line on this Map. Diverging from the northerly line and striking in a N. E. direction, the rich alluvial deposits of gold, all fine steam gold are reached on the Sĕgāmet River, a valuable river in Johor where every facility would be given by His Highness the Maharaja to Europeans to open up mines and whose letters to native rajas were most serviceable to me when I went across the Peninsula to Pahang.

Still in a northerly direction, the tin-mines of Pĕnārek and Jumpol are reached thence to the tin-mines of Sunge

Nipa, a tributary of a large river the Sungei Triang thence to Sungei Kěnâbus where both tin and gold are found, thence to Jêlei, a gold district.

Striking off in a N. N. E. direction to the Sungei Lui, a tributary of the Pahang River, gold is found in deep alluvial deposits in large quantities, but the Bëndahâra of Pahang will not allow Europeans to visit this place, and prevents the Chinese from introducing machinery, so that the gold is most imperfectly worked. The Malays in that district told me, that they got gold at the bottom of wells, that were dug, in bunches and nests; and the gold, after the dirt is crushed and washed in a rude way with pestle and mortar, is brought up in a cocoanut shell and must be sold to the Bëndahâra of Pahang. The market price, when I was in the country, was \$22 a bungkal, but the gold is frequently smuggled over the range into Sêlângor where the Chinese goldsmiths give \$32 a bunkel and in Singapore the same gold ranes in price from \$35 to \$40 a bungkal.

I have so far pointed out some of the gold and tin-mines to the Eastward of the dividing range of the Peninsula, and regarding the Westward side, I may say that the whole of the flat country at the foot of the range is a vast broken alluvial deposit of tin some 250 miles in length and ranging from one to 12 miles in width and again winding to the Northwest to Tongkah and up to British Burmah.

With respect to the gold on the Westward side of the range, there are only two places to my knowledge that produce gold with the tin, namely Kanching in Sêlângor and the Batang Padang District in Perak; that is that produce gold in sufficient quantities, to make a profit on the expenses of separating it from the tin. Returning to the gold mines of Ulu Sungei Lui and proceeding in a straight line to Cape Patani in a N. N. W. direction, the gold mines of Klian Mas are crossed on the Sungei Lëbih, which is a tributary of the Kêlantan River, and on the same bearing some Galena mines are in full working order on the Kêlantan River. Gold and tin are known to exist in the interior of Trěnggâno, but the protective policy of the Trěngano and Kêlantan rajas precludes the examination and proper working by European machinery of the valuable deposits that have been known to exist for so long. The Sultans of these countries are afraid of the rajas and are completely in their power; but as they are tributary to Siam, and as the Siamese Kings are

progressive in developing the resources of their own country, I have no doubt the proper credentials from Bangkok, would enable a European to enter and work these valuable mines on an economical and more profitable system.

Pursuing the same N. N. W. line, the gold mines of Klian Mas on the Teluphin River, and the Galena mines at Palu are reached, as well as other gold deposits in Patani, and this would lead to the terminus of the supposed matrix of the metalliferous deposits.

I stop at Cape Patani as the country further to the W. and N. W. is not remarkable for the precious metals, although coal has been found in the Isthmus of Kra.

I have shewn by a red line on this plan the approximate position of the main-reef which I believe to exist in the Peninsula; and besides the fact of the numerous alluvial mineral detrita and disconnected leaders that exist to the Eastward and Westward of the same there are other geological reasons that would support the theory. I need hardly state that one of the first laws of Geology is that all soils are disintegrated from rock, and an agriculturist coming to a new country can make a very fair guess as to the nature of the soil on being informed of the nature of the rocks. So it is for the miner,—given the nature, set, direction and dip of various strata, he will tell whether the country is metalliferous or not; and it was by means of this chain of reasoning that Sir Roderick Murchison prophesied the discovery of the gold fields of Ballarat, and thence a line of rich gold country to the Northward through Queensland, and other islands, to the north of Australia. And it is by studying and following up the wise precepts of that illustrious Geologist that we may deduct similar conclusions in new countries.

It is in examining the metamorphic rocks that the greatest geological discoveries have been made; and in the Malay Peninsula, these rocks in higher elevations and in regions that have been disturbed by plutonic causes, are remarkable.

Both gold and tin belong exclusively to the older formation, and both are found in veins of quartz origin imbedded generally between the granite on one side, and slate or micaceous layers or sandstones on the other, and these places occur to my knowledge in several parts in the Peninsula.

During an exploring expedition with a view to fixing the Boundaries between Perak and Siamese territory, and in

crossing a range of hills, I came upon different parts of the country, where the slate formation cropped up with a very slight dip out of the perpendicular, close to the granite, and which reminded me very forcibly of similar formations in the gold-bearing districts of Australia.

On enquiry, the Malays stated there had been gold alluvial deposits at the base of these hills, and that there were still some Chinamen washing stream-gold. I obtained some of the gold in dust, and it presented a coarse, scaly appearance which evidently showed that it had not travelled far after having been shed from the matrix; and confirmed an opinion that I had formed that all the mineral deposits of gold and tin in the Malay Peninsula are a recent granite or micaceous detritus.

These detrital deposits might be followed up by an exploring prospecting party, armed with boring tools; and by boring through the quartz veins that pierce the granite, the original lode or valuable leaders might be uncovered.

I am informed that there are two places, namely Ulu Slini on the borders of Sĕlāngor and Perak, and the Batang Padang District in Perak, where the tin is found in large blocks of stone which are rolled down the hill side. These must be very close to the main lode and would be good starting points for a prospecting party.

The Chinaman is given to gambling, and a large population of Chinese indulge their taste in seeking out patches of alluvial tin, moving along the base of the hills from place to place, and gaining a very uncertain amount of success. This state of things will continue until the original lode is searched for, when the reckless speculation in alluvial gold and tin will be succeeded by a more certain and legitimate system of mining, and the prosperity of the Malayan Peninsula will rest on a more solid basis.